

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-40

Name: McCook Lake

County: Union

Legal Description: T89N-R48W-Sec 4, 9-10, 15-16, 21

Location from nearest town: 3 miles northwest of North Sioux City, SD

Dates of present survey: August 13-15, 2007 (netting); June 18, 2007 (electrofishing)

Date last surveyed: August 15-17, 2005 (netting); June 9, 2005 (electrofishing)

Primary Game Species	Secondary and Other Species
White Crappie	White Bass
Black Crappie	Bluegill
Largemouth Bass	Gizzard Shad
Channel Catfish	Shortnose Gar
Walleye	Bigmouth Buffalo
	Freshwater Drum
	Smallmouth Buffalo
	Common Carp
	Shorthead Redhorse

PHYSICAL DATA

Surface area: 273 acres

Watershed area: 2,985 acres

Maximum depth: 14 feet

Mean depth: 6 feet

Volume: 732 acre feet

Shoreline length: 6.9 miles

Contour map available: No

Date mapped: NA

Lake elevation observed during the survey: Full

Beneficial use classifications: (5) warmwater semipermanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, and (9) fish and wildlife propagation and stock watering.

Introduction

McCook Lake is a natural oxbow lake located in southeast Union County. The lake was named for General John Cook who commanded a company of soldiers stationed there in 1864. It is unknown when or why the "Mc" was added.

Ownership of Lake and Adjacent Lakeshore Property

McCook Lake is listed as a meandered lake in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. The entire shoreline of the lake is privately owned and heavily developed.

Fishing Access

There is a city-owned boat ramp with a dock on the southeastern shore of the lake. Shore fishing access is extremely limited due to extensive shoreline development.

Field Observations of Water Quality and Aquatic Vegetation

The water was cloudy gray with a Secchi depth measurement of 51 cm (20 in) during the survey. There was some curly leaf pondweed (*Potamogeton crispus*), floating-leaf pondweed (*Potamogeton natans*), and brittle naiad (*Najas minor*) present. River bulrush (*Scirpus fluviatilis*) and cattails (*Typha* spp.) were also observed in a few shallow areas.

BIOLOGICAL DATA

Methods:

McCook Lake was sampled on August 13-15, 2007 with four overnight gill net sets and ten overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh ($\frac{3}{4}$ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ($\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in) monofilament netting. Two hours of nighttime electrofishing were done on June 18, 2007 to evaluate the largemouth bass population. A map of the sampling sites was not available.

Results and Discussion:

Gill Net Catch

Channel catfish, white bass, and gizzard shad made up the majority of the 2007 gill net sample (80.3%). Other species sampled included walleye, largemouth bass, yellow perch, bigmouth buffalo, shortnose gar, freshwater drum, and white crappie.

Table 1. Total catch from four overnight gill net sets at McCook Lake, Union County, August 13-15, 2007.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Channel Catfish	81	46.8	20.3	± 7.8	8.9	48	5	92
White Bass	30	17.3	7.5	± 4.0	4.6	100	52	94
Gizzard Shad	28	16.2	7.0	± 4.0	7.8	100	--	91
Walleye	11	6.4	2.8	± 1.5	0.1	9	0	82
Largemouth Bass	10	5.8	2.5	± 0.0	0.1	--	--	--
Yellow Perch	6	3.5	1.5	± 1.1	0.0	--	--	--
Bigmouth Buffalo	3	1.7	0.8	± 1.0	0.0	--	--	--
Shortnose Gar	2	1.2	0.5	± 0.6	0.8	--	--	--
Freshwater Drum	1	0.6	0.3	± 0.3	2.3	--	--	--
White Crappie	1	0.6	0.3	± 0.3	0.9	--	--	--

* 7 years (1993, 1995, 1997, 1999, 2001, 2003, 2005)

Trap Net Catch

White bass, bluegill, black crappie, channel catfish, and white crappie were the most abundant species in the 2007 trap net sample (83.5 %) (Table 2). Other species sampled included freshwater drum, largemouth bass, common carp, yellow perch, shortnose gar, and bigmouth buffalo.

Table 2. Total catch from ten overnight trap net sets at McCook Lake, Union County, August 13-15, 2007.

Species	Number	Percent	CPUE ¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
White Bass	33	30.3	3.3	+1.7	0.1	0	0	97
Bluegill	16	14.7	1.6	+0.8	1.8	19	0	115
Black Crappie	15	13.8	1.5	+0.6	1.6	73	20	98
Channel Catfish	14	12.8	1.4	+0.9	0.2	25	0	89
White Crappie	13	11.9	1.3	+0.6	8.5	38	8	105
Freshwater Drum	7	6.4	0.7	+0.4	1.1	--	--	--
Largemouth Bass	3	2.8	0.3	+0.2	0.0	--	--	--
Common Carp	3	2.8	0.3	+0.3	0.4	--	--	--
Yellow Perch	2	1.8	0.2	+0.2	0.1	--	--	--
Shortnose Gar	2	1.8	0.2	+0.2	1.1	--	--	--
Bigmouth Buffalo	1	0.9	0.1	+0.1	0.0	--	--	--

* 7 years (1993, 1995, 1997, 1999, 2001, 2003, 2005)

Electrofishing Catch

Twenty-seven largemouth bass with a PSD of 50, RSD-P of 15, and a mean Wr of 105 were sampled in two hours of nighttime electrofishing (Table 3).

Table 3. Total catch from two hours of nighttime electrofishing on McCook Lake, Union County, June 18, 2007.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	27	100	13.5	+18.2	16.9	50	15	105

* 4 years (1999, 2001, 2003, 2005)

White Crappie

Management objective: Maintain a crappie fishery with a trap net CPUE of at least 20 and PSD of at least 40.

¹ See Appendix A for definitions of CPUE, PSD, RSD-P, and mean Wr.

White crappie abundance has remained low following the decline that occurred after 2003 (Table 4). The size structure of the population has also declined which indicates some young fish are recruiting (Figure 1). White crappie condition (mean Wr) improved to 105 following a low of 90 in 2005 (Table 4).

Table 4. White crappie trap-net CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	0.2		10.2		48.9		1.2		1.3	10.1
PSD	--		38		17		67		38	41
RSD-P	--		0		3		58		8	20
Mean Wr	--		119		107		90		105	105

*6 years (1995, 1997, 1999, 2001, 2003, 2005)

Black Crappie

Management objective: Maintain a crappie fishery with a trap net CPUE of at least 20 and PSD of at least 40.

Black crappie trap net CPUE and Wr decreased in 2007 while PSD and RSD-P increased (Table 5). Growth is very slow with fish only reaching 20 cm (8 inches) between age-4 and age-5 (Table 6).

Table 5. Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	4.0		38.6		0.0		11.1		1.5	9.5
PSD	45		22		--		21		73	31
RSD-P	5		0		--		0		20	2
Mean Wr	118		107		--		107		98	112

*6 years (1995, 1997, 1999, 2001, 2003, 2005)

Table 6. Average back-calculated lengths (mm) for each age class of black crappie in McCook Lake, Union County, 2007.

Year Class	Age	N	Back-calculation Age							
			1	2	3	4	5	6	7	8
2006	1	4	57							
2002	5	1	69	119	176	200	230			
2001	6	10	70	104	137	170	202	224		
All Classes		15	65	112	156	185	216	224		
Statewide Mean			83	147	195	229	249			
Region III Mean			95	167	219	253	274			
LLI* Mean			89	161	210	247	271			

*Large Lakes and Impoundments (>150 surface acres)

Bluegill

Management objective: Maintain a bluegill fishery with a trap net CPUE of at least 20 and RSD-18 of at least 20.

Bluegill trap-net CPUE increased to 1.6 in 2007 (Table 7) which matches the six-year mean but is still far below the management objective. The population contains mostly small fish that are 8 to 16 cm (3.1 to 6.3 in) long.

Table 7. Bluegill trap-net CPUE, PSD, RSD-18, RSD-P, and mean Wr for McCook Lake, Union County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	0.2		1.4		7.4		0.8		1.6	1.6
PSD	--		--		5		--		19	5
RSD-18	--		--		0		--		0	0
RSD-P	--		--		0		--		0	0
Mean Wr	--		--		98		--		115	98

*6 years (1995, 1997, 1999, 2001, 2003, 2005)

Channel Catfish

Management objective: Maintain a channel catfish fishery with a gill net CPUE of at least 15.

Channel catfish gill net CPUE has remained above our management objective since 2001 (Table 8) although no stocking has been done since 1993 (Table 12). The placement of artificial spawning structures combined with the nesting cavities created by extensive riprapping may be contributing to consistent natural reproduction and the abundant gizzard population is providing an excellent forage base.

Table 8. Channel catfish gill net and trap net CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
GN CPUE	3.3		13.7		19.0		24.5		20.3	15.1
PSD	--		19		56		15		48	30
RSD-P	--		0		0		2		5	1
Mean Wr	--		--		85		86		92	86

*4 years (1999, 2001, 2003, 2005)

Largemouth Bass

Management objective: Maintain a largemouth bass fishery with an electrofishing CPH of at least 20, PSD = 40-70 and RSD-P = 20-40.

Largemouth bass electrofishing CPUE decreased slightly from 2005 (Table 9) and remains below the management objective. Bass growth in McCook Lake is similar to the Region III average (Table 10). A modest bass density and relatively uniform distribution of fish from 140-490 mm (Figure 4; 5.5-19.3 in) suggests limited, but consistent annual recruitment.

Table 9. Largemouth bass electrofishing CPUE, PSD, RSD-P, and mean Wr for McCook Lake, Union County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	26.5		17.0		10.0		14.0		13.5	16.9
PSD	35		55		68		89		50	62
RSD-P	9		16		21		29		15	19
Mean Wr	95		90		98		91		105	94

*4 years (1999, 2001, 2003, 2005)

Table 10. Average back-calculated lengths (mm) for each age class of largemouth bass in McCook Lake, Union County, 2007.

Year Class	Age	N	Back-calculation Age							
			1	2	3	4	5	6	7	8
2006	1	9	134							
2005	2	5	93	221						
2004	3	2	103	252	293					
2003	4	1	97	226	284	315				
2002	5	4	100	207	282	316	350			
2001	6	2	128	218	306	355	388	416		
1999	8	1	193	246	320	373	412	447	461	479
All Classes		24	121	228	297	340	384	431	461	479
Statewide Mean			96	182	250	305	342			
Region III Mean			111	212	287	347	383			
LLI Mean			89	178	256	316	359			

All Species

Thirteen different species were sampled in 2007 bigmouth buffalo were seen after being absent for 10 years (Table 11). Largemouth bass were caught in both netting gears and yellow perch gill net CPUE was at the highest level recorded. Catches for other species remain within previously observed ranges.

Table 11. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in McCook Lake, Union County, 1993-2007.

Species	1993	1995	1997	1999	2001	2003	2005	2007
SNG (GN)	0.2	--	1.0	0.3	1.3	2.7	--	0.5
SNG (TN)	1.8	0.3	0.1	0.5	0.1	1.0	0.1	0.2
GZD (GN)	9.2	13.5	19.0	6.7	22.0	18.3	7.0	7.0
GZD (TN)	--	0.2	--	0.1	--	--	--	--
COC (GN)	0.5	0.5	--	0.3	0.3	0.7	--	--
COC (TN)	0.3	1.0	0.2	0.2	0.5	0.3	0.3	0.3
RIC (GN)	--	--	--	--	--	--	--	--
RIC (TN)	0.2	0.1						--
SAB (GN)	--	--	--	--	0.3	0.3	--	--
SAB (TN)	--	--	--	--	--	--	--	--
BIB (GN)	--	--	0.5	--	--	--	--	0.8
BIB (TN)	--	0.2	--	--	--	--	--	0.1
SHR (GN)	--	--	--	--	--	0.3	--	--
SHR (TN)	--	--	--	--	--	0.1	0.1	--
BCF (GN)	0.2	--						--
BCF (TN)	--	--						--
CCF (GN)	0.7	0.5	1.0	3.3	13.7	19.0	24.5	20.3
CCF (TN)	--	0.2	--	0.2	--	1.5	0.8	1.4
WHB (GN)	0.2	0.5	6.5	18.3	2.3	1.3	2.5	7.5
WHB (TN)	2.8	4.8	0.9	0.7	--	0.7	0.6	3.3
BLG (GN)	--	--	--	--	--	--	--	--
BLG (TN)	2.1	0.1	0.4	0.2	1.4	7.4	0.8	1.6
LMB (GN)	--	--	--	--	--	--	--	2.5
LMB (TN)	--	--	--	--	--	--	--	0.3
WHC (GN)	--	--	--	--	0.7	5.7	--	0.3
WHC (TN)	--	--	--	0.2	10.2	48.9	1.2	1.3
BLC (GN)	0.2	0.5	--	0.3	--	--	--	--
BLC (TN)	24.4	2.8	0.6	4.0	8.0	--	11.1	1.5
YEP (GN)	--	--	--	--	--	0.3	--	1.5
YEP (TN)	0.3	0.2	0.1	--	--	--	--	0.2
SAR (GN)	--	--	--	--	--	0.3	--	--
SAR (TN)	--	--	--	--	--	--	--	--
SXW (GN)	--	0.5	--	--	--	--	--	--
SXW (TN)	--	0.4	--	--	0.2	--	--	--
WAE (GN)	--	--	--	0.3	--	0.7	--	2.8
WAE (TN)	0.1	--	0.3	0.1	--	0.1	--	--
FRD (GN)	1.0	6.0	1.5	5.0	1.0	1.3	0.5	0.3
FRD (TN)	2.2	1.2	0.5	0.4	0.2	1.5	0.5	0.7

SNG (Shortnose Gar), GZD (Gizzard Shad), COC (Common Carp), BIB (Bigmouth Buffalo), SAB (Smallmouth Buffalo), RIC (River Carpsucker), SHR (Shorthead Redhorse), CCF (Channel Catfish), BCF (Blue Catfish), WHB (White Bass), BLG (Bluegill), LMB (Largemouth Bass), BLC (Black Crappie), WHC (White Crappie), YEP (Yellow Perch), SAR (Sauger), SXW (Saugeye), WAE (Walleye), FRD (Freshwater Drum)

Table 12. Stocking record for McCook Lake, Union County, 1991-2007.

Year	Number	Species	Size
1991	30,000	Walleye	Fingerling
	15,000	Channel Catfish	Fingerling
1993	30,000	Channel Catfish	Fingerling
1994	100,000	Saugeye	Fingerling
	5,157	Saugeye	Lrg. Fingerling
1995	27,400	Saugeye	Fingerling
1996	30,000	Bluegill	Fingerling
1997	6,000	Walleye	Fingerling
1999	54,000	Walleye	Fingerling
	510	White Crappie	Adult
2000	2,796	White Crappie	Adult
2007	?	Walleye	Adult

MANAGEMENT RECOMMENDATIONS

1. Continue to monitor the fishery by conducting lake surveys every other year. Exotic and native aquatic vegetation abundance is increasing and should help improve fish populations by the next survey.

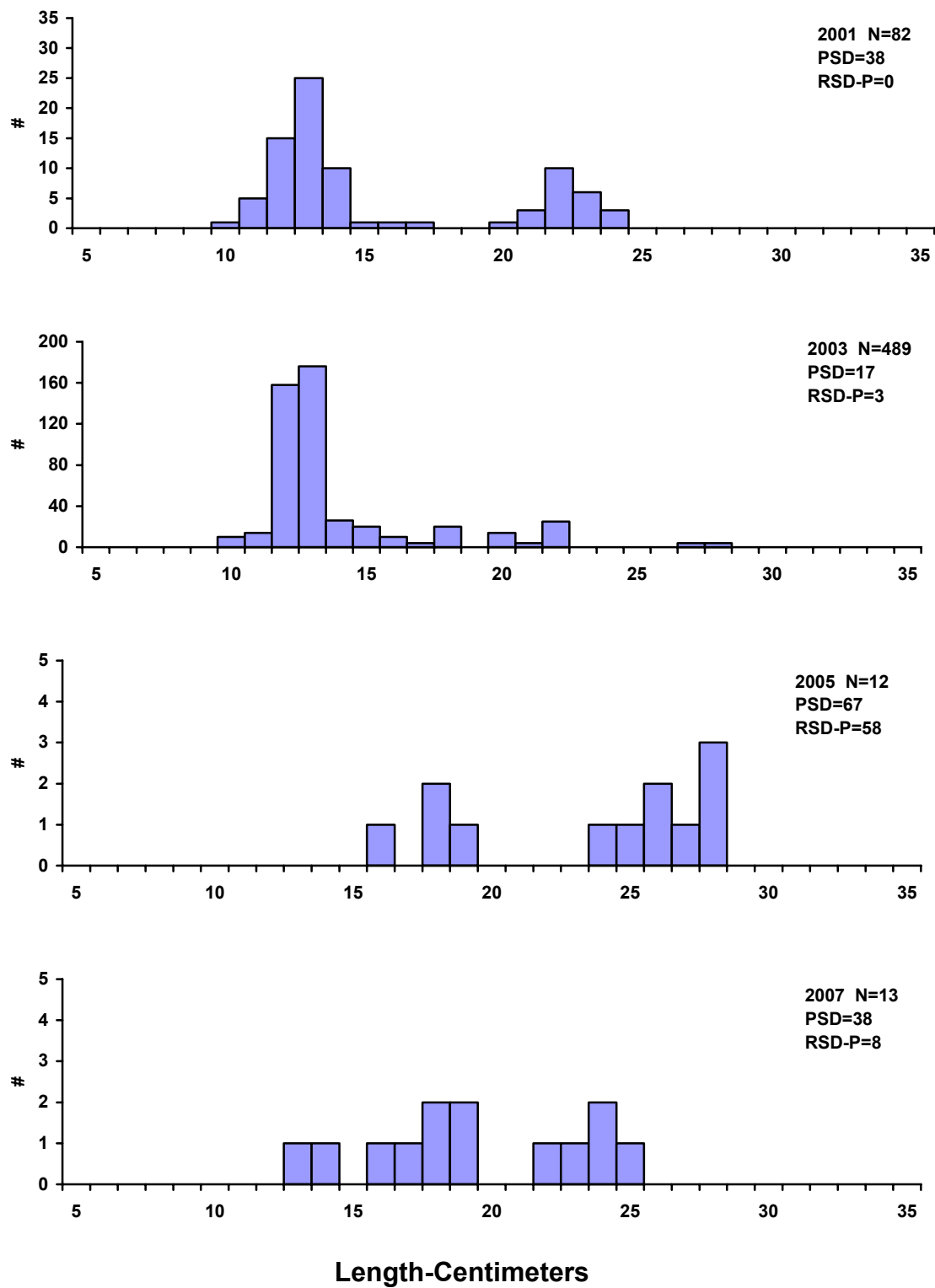


Figure 1. Length frequency histogram for white crappies sampled with trap nets in McCook Lake, Union County, 2001, 2003, 2005, and 2007.

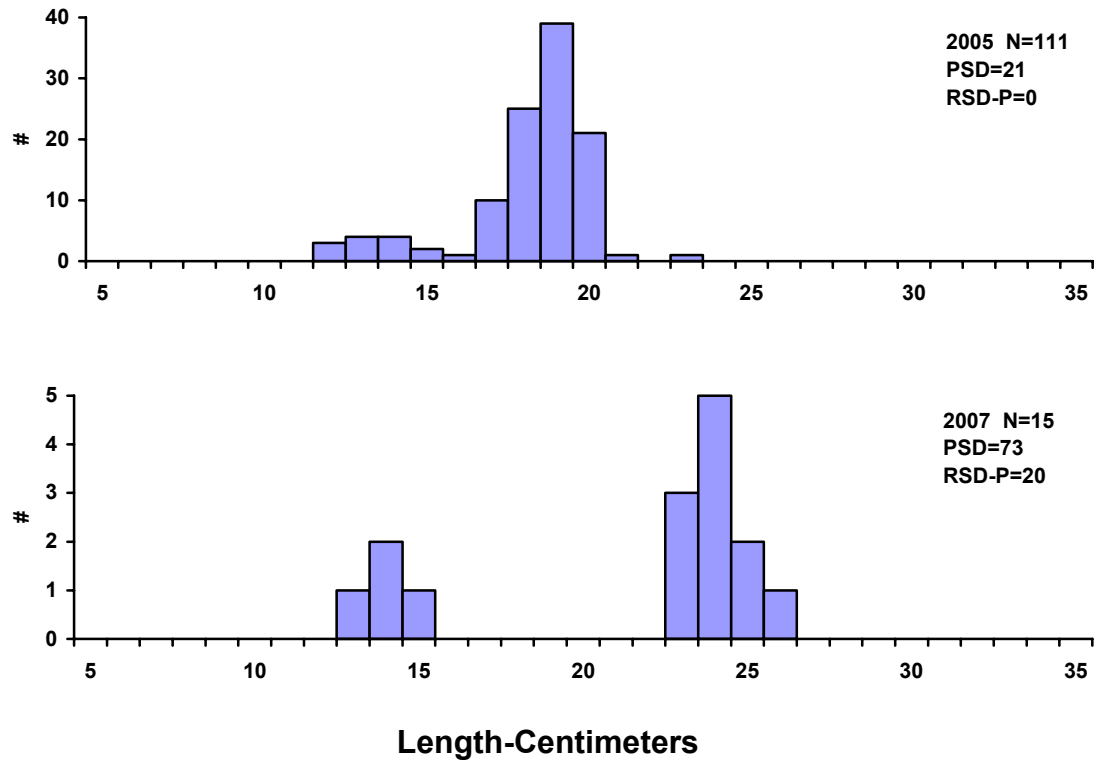


Figure 2. Length frequency histogram for black crappies sampled with trap nets in McCook Lake, Union County, 2005 and 2007.

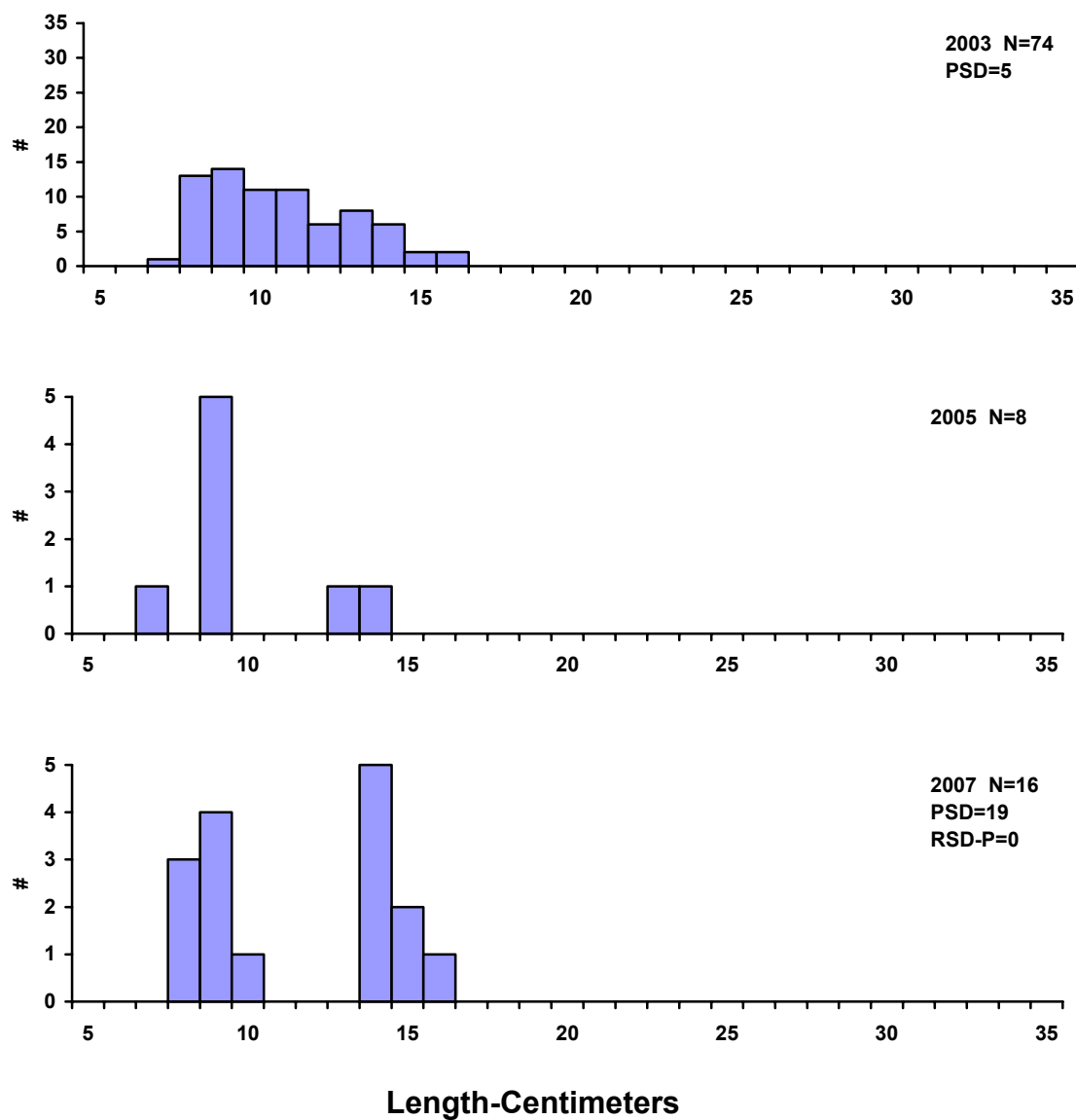
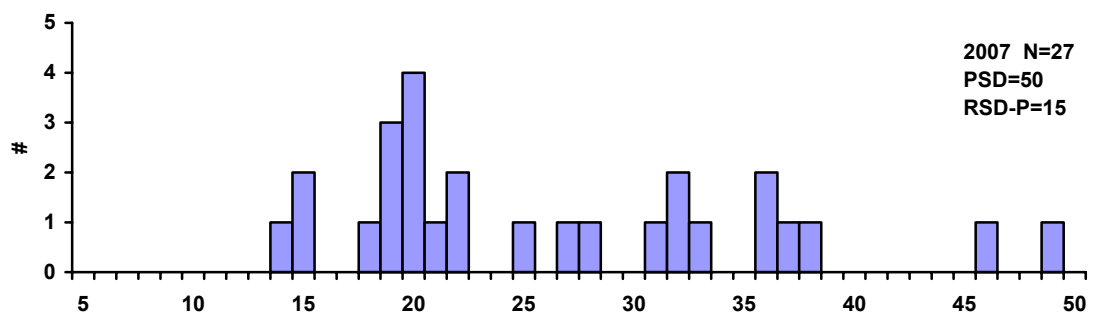
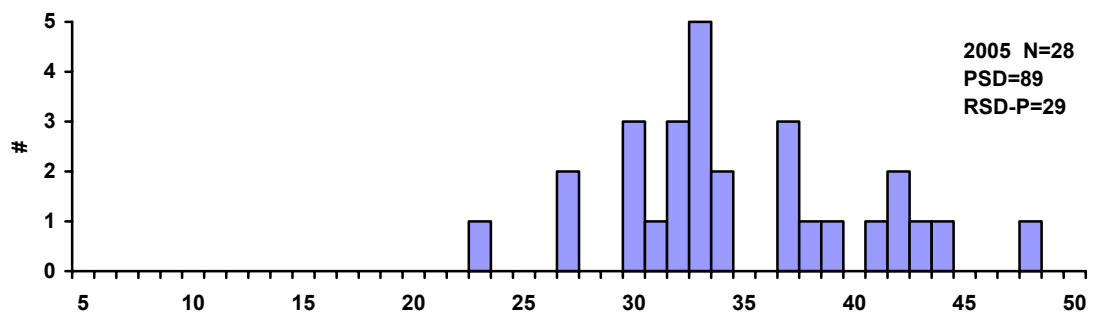
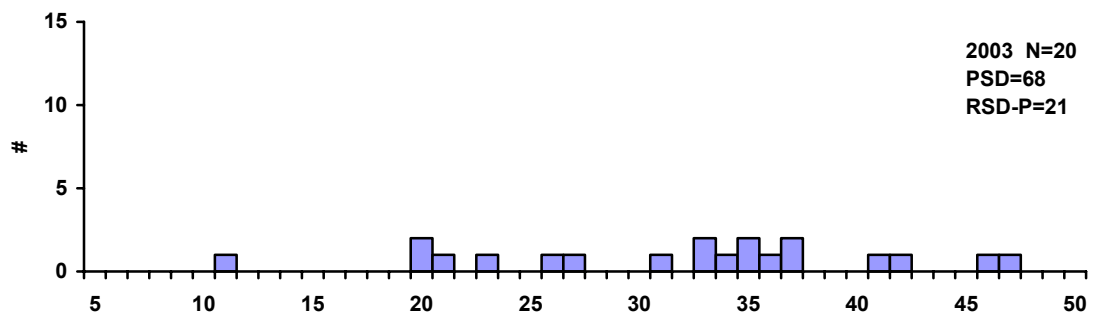
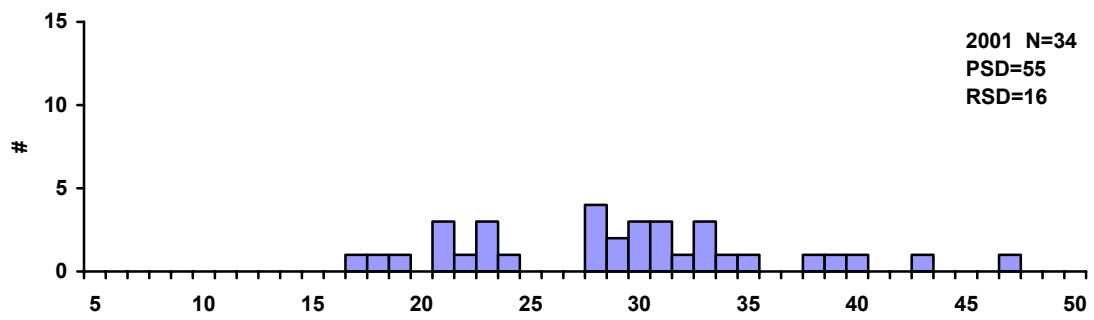


Figure 3. Length frequency histograms for bluegills sampled with trap nets in McCook Lake, Union County, 2003, 2005, and 2007.



Length-Centimeters

Figure 4. Length frequency histograms for largemouth bass sampled by electrofishing in McCook Lake, Union County, 2001, 2003, 2005, 2007.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.